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IS 13170-2 (1999): Connections for Fluid Power and General Use - Ports and Stud Ends with ISO 261 Threads and O-Ring Sealing, Part 2: Heavy Duty (S Series) Stud Ends - Dimensions, Design, Test Methods and Requirements [PGD 17: Fluid Power Fittings, Hoses and Hose Assemblies]

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भारतीय मानक

(Reaffirmed 2004)

तरल शक्ति और सामान्य प्रयोजन के लिए संयोजन — ISO 261 चूड़ियों और ओ-रिंग सीलिंग वाले छिद्र और स्टड सिरे

भाग 2 भारी कार्य (एस शृंखला) स्टड सिरे — आयाम, डिजाइन, परीक्षण पद्धतियाँ और अपेक्षाएँ

Indian Standard

CONNECTIONS FOR FLUID POWER AND GENERAL USE — PORTS AND STUD ENDS WITH ISO 261 THREADS AND O-RING SEALING

PART 2 HEAVY DUTY (S SERIES) STUD ENDS — DIMENSIONS, DESIGN, TEST METHODS AND REQUIREMENTS

ICS 23.100.40

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

August 1999

Price Group 5

Fluid Power Fittings, Hoses and Hose Assemblies Sectional Committee, PE 17

NATIONAL FOREWORD

This Indian Standard which is identical with ISO 6149-2 : 1993 'Connections for fluid power and general use — Ports and stud ends with ISO 261 threads and O-ring sealing — Part 2 : Heavy-duty (S Series) stud ends — Dimensions, design, test methods and requirements', issued by the International Organization for Standardization (ISO), was adopted by the Bureau of Indian Standards on the recommendation of the Fluid Power Fittings, Hoses and Hose Assemblies Sectional Committee (PE 17) and approval of the Production Engineering Division Council.

IS 13170 was first published in 1991 based on ISO 6149:1980 'Fluid power systems and components — Metric ports — Dimensions and design'. The ISO Standard has since been revised and split into following three parts:

ISO 6149-1:1993 Connections for fluid power and general use — Ports and stud ends with ISO 261 threads and O-ring sealing — Part 1 : Ports with O-ring seal in truncated housing

ISO 6149-2:1993 Connections for fluid power and general use — Ports and stud ends with ISO 261 threads and O-ring sealing — Part 2 : Heavy duty (S series) stud ends — Dimensions, design, test methods and requirements

ISO 6149-3:1993 Connections for fluid power and general use — Ports and stud ends with ISO 261 threads and O-ring sealing — Part 3 : Light-duty (L series) stud ends — Dimensions, design, test methods and requirements

To align the Indian Standards with International practices the sectional committee dealing with the subject decided to adopt ISO 6149-2 : 1993 as Indian Standard and publish the same as IS 13170 (Part 2).

In the adopted standard, certain terminology, conventions and method of presentation are not identical to those used in Indian Standards. Attention is particularly drawn to the following:

a) Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard'.

b) Comma (,) has been used as a decimal marker in the International Standard while in Indian Standards, the current practice is to use a point (.) as the decimal marker.

In the adopted standard, reference appears to certain International Standards for which Indian Standards also exist. The corresponding Indian Standards which are to be substituted in their place are listed below along with their degree of equivalence for the editions indicated:

International Standard	*Corresponding Indian Standard*	*Degree of Correspondence*
ISO 48 : 1994 Rubber, vulcanized or thermo-plastic — Determination of hardness (hardness between 10 IRHD and 1 000 IRHD)	IS 3400 (Part 2) : 1995 Methods of test for vulcanized rubbers: Part 2 Hardness (*second revision*)	Technically Equivalent
ISO 261 : 1998 ISO general purpose metric screw threads — General plan	IS 4218 (Part 2) : 1976 ISO metric screw threads : Part 2 Diameter pitch combination (*first revision*)	do
ISO 965-1 : 1980 ISO general purpose metric screw threads — Tolerances — Part 1 : Principles and basic data	IS 4218 (Part 5) : 1976 ISO metric screw threads : Part 5 Tolerances (*first revision*)	do
ISO 3448 : 1992 Industrial liquid lubricants — ISO viscosity classification	IS 9466:1980 Viscosity classification of industrial liquid lubricants	do

(*Continued on third cover*)

Indian Standard

CONNECTIONS FOR FLUID POWER AND GENERAL USE — PORTS AND STUD ENDS WITH ISO 261 THREADS AND O-RING SEALING

PART 2 HEAVY DUTY (S SERIES) STUD ENDS — DIMENSIONS, DESIGN, TEST METHODS AND REQUIREMENTS

1 Scope

This part of ISO 6149 specifies dimensions, performance requirements and test procedures for metric adjustable and non-adjustable heavy-duty (S series) stud ends and O-rings.

Stud ends in accordance with this part of ISO 6149 may be used at working pressures up to 63 MPa (630 bar[1]) for non-adjustable stud ends, and 40 MPa (400 bar) for adjustable stud ends. The permissible working pressure depends upon the stud end size, materials, design, working conditions, application, etc.

For threaded ports and stud ends specified in new designs in hydraulic fluid power applications, only ISO 6149 is to be used. Threaded ports and stud ends in accordance with ISO 1179 and ISO 11926 are not to be used for new designs in hydraulic fluid power applications.

Conformance to the dimensional information in this part of ISO 6149 does not guarantee rated performance. Each manufacturer should perform testing according to the specification contained in this part of ISO 6149 to assure that components comply with the performance ratings.

NOTE 1 A significant number of tests have been conducted to confirm the performance requirements of connection ends made from carbon steel. This part of ISO 6149 applies to fittings detailed in ISO 8434-1, ISO 8434-3 and ISO 8434-4.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 6149. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 6149 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 48:—[2], *Rubber, vulcanized or thermoplastic — Determination of hardness (hardness between 10 IRHD and 100 IRHD) (Combined revision of the second edition (ISO 48:1979), and ISO 1400:1975 and ISO 1818:1975).*

ISO 261:—[3], *ISO general-purpose metric screw threads — General plan.*

ISO 965-1:1980, *ISO general purpose metric screw threads — Tolerances — Part 1: Principles and basic data.*

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[1] 1 bar = 0,1 MPa = 10^5 Pa; 1 MPa = 1 N/mm^2

[2] To be published.

[3] To be published. (Revision of ISO 261:1973)

ISO 3448:1992, *Industrial liquid lubricants — ISO viscosity classification.*

ISO 3601-3:1987, *Fluid systems — Sealing devices — O-rings — Part 3: Quality acceptance criteria.*

ISO 4759-1:1978, *Tolerances for fasteners — Part 1: Bolts, screws and nuts with thread diameters between 1,6 (inclusive) and 150 mm (inclusive) and product grades A, B and C.*

ISO 5598:1985, *Fluid power systems and components — Vocabulary.*

ISO 6149-1:1993, *Connections for fluid power and general use — Ports and stud ends with ISO 261 threads and O-ring sealing — Part 1: Ports with O-ring seal in truncated housing.*

ISO 6803:1984, *Rubber or plastics hoses and hose assemblies — Hydraulic pressure impulse test without flexing.*

ISO 7789:—[4], *Hydraulic fluid power — Two-, three- and four-port screw-in cartridge valves — Cavities.*

3 Definitions

For the purposes of this part of ISO 6149, the definitions given in ISO 5598 and the following definitions apply.

3.1 adjustable stud end: Stud end connector that allows for fitting orientation through final tightening of the locknut to complete the connection. This type of stud end is typically used on shaped fittings (e.g. tees, crosses and elbows).

3.2 non-adjustable stud end: Stud end connector that does not require specific orientation before final tightening of the connection because it is only used on straight fittings.

4 Dimensions

Heavy-duty (S series) stud ends shall conform to the dimensions shown in figures 1 and 2 and given in table 1. Hex tolerances across flats shall be in accordance with ISO 4759-1, product grade C.

5 Requirements

5.1 Working pressure

Heavy-duty (S series) stud ends made of low carbon steel shall be designed for use at the working pressures given in table 2.

5.2 Performance

Heavy-duty (S series) stud ends made of low carbon steel shall meet at least the burst and impulse pressures given in table 2, when tested in accordance with clause 7.

5.3 Flatness and fit of adjustable stud end washers

The washer shall be clinched to the stud end with a tight slip fit to an interference fit. The slip fit shall be tight enough so that the washer cannot be shaken loose to cause it to drop from its uppermost position by its own weight. The locknut torque needed to move the washer at the maximum washer interference fit shall not exceed the torques given in table 3.

Any washer surface that is out of flatness shall be uniform (i.e. not wavy) and concave with respect to the stud end and shall conform to the allowances given in table 3.

6 O-rings

O-rings for use with heavy-duty (S series) stud ends shall conform to the dimensions shown in figure 3 and given in table 4.

7 Test methods

Parts used for the cyclic endurance or burst test shall not be tested further, used or returned to stock.

7.1 Burst pressure test

7.1.1 Principle

Test three samples to confirm that heavy-duty (S series) stud ends meet or exceed a ratio of 4:1 between the burst and working pressures.

7.1.2 Materials

7.1.2.1 Test block and stud ends

Test blocks shall be unplated and hardened to 50 HRC to 55 HRC. Stud ends shall be made from low carbon steel and shall be plated.

7.1.2.2 Test O-rings

Unless otherwise specified, O-rings shall be made from nitrile (NBR) rubber with a hardness of $(85\,^{+10}_{0})$ IRHD when measured in accordance with ISO 48. O-rings shall conform to the dimensions given in table 4 and shall meet or exceed the quality requirement grade N of ISO 3601-3.

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[4] To be published.

7.1.3 Procedure

7.1.3.1 Thread lubrication

For testing only, threads and contact surfaces shall be lubricated with hydraulic oil with a viscosity of VG 32 in accordance with ISO 3448 prior to the application of torque.

7.1.3.2 Stud end torque

Test stud ends after application of the torques given in table 5. Apply adjustable stud end locknut torques after the stud end has been backed out one full turn from finger-tight position, to test correctly the worst possible actual assembly conditions.

7.1.3.3 Pressure rise rate

During the burst test, the rate of pressure rise shall not exceed 138 MPa/min (1 380 bar/min).

7.1.4 Test report

Test results and conditions shall be reported on the test data form given in annex A.

7.2 Cyclic endurance (impulse) test

7.2.1 Principle

Test six samples at their respective impulse pressures.

7.2.2 Materials

Use the same materials as those given in 7.1.2.

7.2.3 Procedure

7.2.3.1 Thread lubrication

Apply lubricant as specified in 7.1.3.1.

7.2.3.2 Stud end torques

Apply torque as specified in 7.1.3.2.

7.2.3.3 Cycle and pressure rise rate

The cycle rate shall be uniform between 0,5 Hz and 1,3 Hz and shall conform to the wave pattern shown in ISO 6803, except that the pressure rise rate shall be adjusted accordingly.

7.2.4 Requirements

The six samples tested shall pass a cyclic endurance test of 1 000 000 cycles.

7.2.5 Test report

Test results and conditions shall be reported on the test data form given in annex A.

8 Designation of stud ends

Heavy-duty (S series) stud ends shall be designated by

a) "Stud end";

b) reference to this part of ISO 6149, i.e. ISO 6149-2;

c) thread size ($d_1 \times P$).

EXAMPLE

Stud end ISO 6149-2 - M18 × 1,5

9 Identification

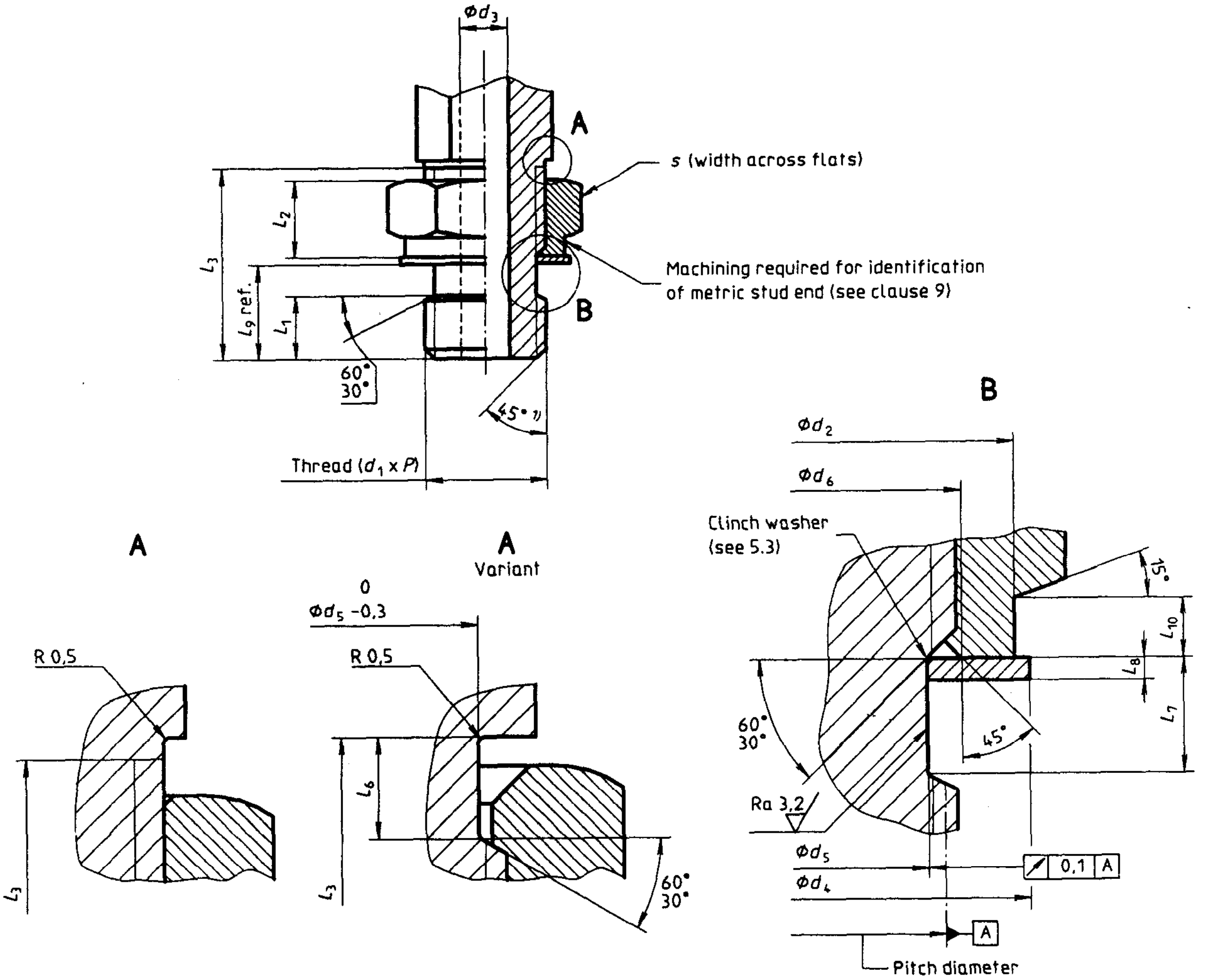
Heavy-duty (S series) stud ends shall be identified as shown in figures 1 and 2 and in accordance with the dimensions given in table 1. Non-adjustable (straight) stud ends shall be identified by a cylindrical machining of diameter d_2 and length L_6 adjacent to thread d_1 and a notch on diameter d_2. Adjustable stud ends shall be identified by only a cylindrical machining of diameter d_2 and length L_{10} on the end of the locknut that is adjacent to the washer. In addition to this identification, for both the non-adjustable and adjustable stud ends, the manufacturer may mark the stud ends with the word "metric".

10 Identification statement (reference to this part of ISO 6149)

Use the following statement in test reports, catalogues and sales literature when electing to comply with this part of ISO 6149:

"Heavy-duty (S series) stud ends conform to ISO 6149-2:1993, *Connections for fluid power and general use — Ports and stud ends with ISO 261 threads and O-ring sealing — Part 2: Heavy-duty (S series) stud ends — Dimensions, design, test methods and requirements.*"

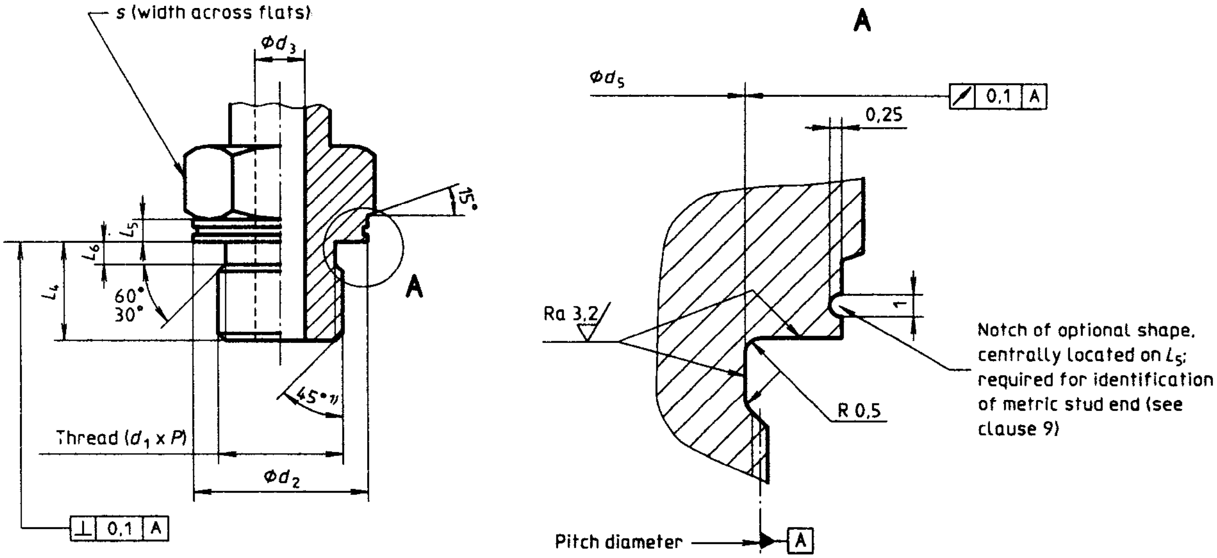
Dimensions in millimetres,
surface roughness in micrometres



1) Chamfer to minor diameter of thread.

Figure 1 — Adjustable heavy-duty (S series) stud end

Dimensions in millimetres,
surface roughness in micrometres



1) Chamfer to minor diameter of thread.

Figure 2 — Non-adjustable heavy-duty (S series) stud end

Table 1 — Dimensions of heavy-duty (S series) stud ends

Dimensions in millimetres

Thread[1] ($d_1 \times P$)	d_2	d_3		d_4	d_5	d_6	L_1	L_2	L_3	L_4	L_5	L_6	L_7	L_8	L_9	L_{10}	s
	± 0,2	nom.	tol.	± 0,4	${}^{0}_{-0,1}$	${}^{+0,4}_{0}$	± 0,2	± 0,2	min.	± 0,2	± 0,1	${}^{+0,3}_{0}$	± 0,1	± 0,08	ref.	± 0,1	
M8 × 1	11,8	2	${}^{+0,14}_{0}$	12,5	6,4	8,1	6,5	7	18	9,5	2,5	2	4	0,9	9,6	1,5	12
M10 × 1	13,8	3	${}^{+0,14}_{0}$	14,5	8,4	10,1	6,5	7	18	9,5	2,5	2	4	0,9	9,6	1,5	14
M12 × 1,5	16,8	4	${}^{+0,18}_{0}$	17,5	9,7	12,1	7,5	8,5	21	11	2,5	3	4,5	0,9	11,1	2	17
M14 × 1,5 [2]	18,8	6	${}^{+0,18}_{0}$	19,5	11,7	14,1	7,5	8,5	21	11	2,5	3	4,5	0,9	11,1	2	19
M16 × 1,5	21,8	7	${}^{+0,22}_{0}$	22,5	13,7	16,1	9	9	23	12,5	2,5	3	4,5	0,9	12,6	2	22
M18 × 1,5	23,8	9	${}^{+0,22}_{0}$	24,5	15,7	18,1	10,5	10,5	26	14	2,5	3	4,5	0,9	14,1	2,5	24
M20 × 1,5 [3]	26,8	—	—	—	17,7	—	—	—	—	14	2,5	3	—	—	—	2,5	—
M22 × 1,5	26,8	12	${}^{+0,27}_{0}$	27,5	19,7	22,1	11	11	27,5	15	2,5	3	5	1,25	14,8	2,5	27
M27 × 2	31,8	15	${}^{+0,27}_{0}$	32,5	24	27,1	13,5	13,5	33,5	18,5	2,5	4	6	1,25	18,3	2,5	32
M33 × 2	40,8	20	${}^{+0,33}_{0}$	41,5	30	33,1	13,5	13,5	33,5	18,5	3	4	6	1,25	18,3	3	41
M42 × 2	49,8	26	${}^{+0,33}_{0}$	50,5	39	42,1	14	14	34,5	19	3	4	6	1,25	18,8	3	50
M48 × 2	54,8	32	${}^{+0,39}_{0}$	55,5	45	48,1	16,5	15	38	21,5	3	4	6	1,25	21,3	3	55
M60 × 2	64,8	40	${}^{+0,39}_{0}$	65,5	57	60,1	19	17	42,5	24	3	4	6	1,25	23,8	3	65

1) Conforming to ISO 261, tolerance grade 6g in accordance with ISO 965-1.

2) Preferred for diagnostic port applications.

3) For plugs for cartridge valve cavities only (see ISO 7789).

Table 2 — Pressures for heavy-duty (S series) stud ends

Thread	Stud end style											
	Non-adjustable						Adjustable					
	Working pressure		Test pressure				Working pressure		Test pressure			
			Burst		Impulse[1]				Burst		Impulse[1]	
	MPa	(bar)	MPa	(bar)	MPa	(bar)	MPa	(bar)	MPa	(bar)	MPa	(bar)
M8 × 1	63	(630)	252	(2 520)	83,8	(838)	40	(400)	160	(1 600)	53,2	(532)
M10 × 1	63	(630)	252	(2 520)	83,8	(838)	40	(400)	160	(1 600)	53,2	(532)
M12 × 1,5	63	(630)	252	(2 520)	83,8	(838)	40	(400)	160	(1 600)	53,2	(532)
M14 × 1,5	63	(630)	252	(2 520)	83,8	(838)	40	(400)	160	(1 600)	53,2	(532)
M16 × 1,5	63	(630)	252	(2 520)	83,8	(838)	40	(400)	160	(1 600)	53,2	(532)
M18 × 1,5	63	(630)	252	(2 520)	83,8	(838)	40	(400)	160	(1 600)	53,2	(532)
M20 × 1,5[2]	40	(400)	160	(1 600)	53,2	(532)	—	—	—	—	—	—
M22 × 1,5	63	(630)	252	(2 520)	83,8	(838)	40	(400)	160	(1 600)	53,2	(532)
M27 × 2	40	(400)	160	(1 600)	53,2	(532)	40	(400)	160	(1 600)	53,2	(532)
M33 × 2	40	(400)	160	(1 600)	53,2	(532)	31,5	(315)	126	(1 260)	41,9	(419)
M42 × 2	25	(250)	100	(1 000)	33,2	(332)	25	(250)	100	(1 000)	33,2	(332)
M48 × 2	25	(250)	100	(1 000)	33,2	(332)	20	(200)	80	(800)	26,6	(266)
M60 × 2	25	(250)	100	(1 000)	33,2	(332)	16	(160)	64	(640)	21,3	(213)

NOTE — These pressures were established using fittings made of low carbon steel when tested in accordance with clause 7.

1) Cyclic endurance test pressure.

2) For plugs for cartridge valve cavities only (see ISO 7789).

Table 3 — Adjustable stud end washer torque and flatness allowances

Thread	Maximum nut torque required to move washer N·m	Maximum washer flatness allowance mm
M8 × 1	1	0,25
M10 × 1	3	0,25
M12 × 1,5	4	0,25
M14 × 1,5	5	0,25
M16 × 1,5	7	0,25
M18 × 1,5	10	0,25
M22 × 1,5	12	0,25
M27 × 2	15	0,4
M33 × 2	20	0,4
M42 × 2	25	0,5
M48 × 2	30	0,5
M60 × 2	40	0,5

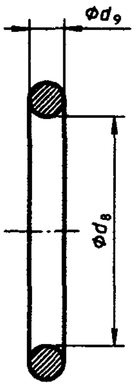


Figure 3 — O-ring

Table 4 — Dimensions of O-rings

Dimensions in millimetres

Thread	Inside diameter d_8		Cross-section diameter d_9	
	nom.	tol.	nom.	tol.
M8 × 1	6,1	± 0,2	1,6	± 0,08
M10 × 1	8,1	± 0,2	1,6	± 0,08
M12 × 1,5	9,3	± 0,2	2,2	± 0,08
M14 × 1,5	11,3	± 0,2	2,2	± 0,08
M16 × 1,5	13,3	± 0,2	2,2	± 0,08
M18 × 1,5	15,3	± 0,2	2,2	± 0,08
M20 × 1,5 (1)	17,3	± 0,22	2,2	± 0,08
M22 × 1,5	19,3	± 0,22	2,2	± 0,08
M27 × 2	23,6	± 0,24	2,9	± 0,09
M33 × 2	29,6	± 0,29	2,9	± 0,09
M42 × 2	38,6	± 0,37	2,9	± 0,09
M48 × 2	44,6	± 0,43	2,9	± 0,09
M60 × 2	56,6	± 0,51	2,9	± 0,09

1) For plugs for cartridge valve cavities only (see ISO 7789).

Table 5 — Torques for stud end qualification test

Thread	Torque N·m $^{+10}_{0}$ %
M8 × 1	10
M10 × 1	20
M12 × 1,5	35
M14 × 1,5	45
M16 × 1,5	55
M18 × 1,5	70
M20 × 1,5 (1)	80
M22 × 1,5	100
M27 × 2	170
M33 × 2	310
M42 × 2	330
M48 × 2	420
M60 × 2	500

1) For plugs for cartridge valve cavities only (see ISO 7789).

Annex A
(normative)

Test data form for ISO 6149-2 ports and stud ends

Stud end specifications:

Manufacturer: .... Test facility: ....
Stud end type: .... Size: ....
Minimum material tensile strength: .... MPa
Stud end working pressure (table 2): .... MPa
Stud end impulse test pressure (table 2): .... MPa
Stud end burst test pressure (table 2): .... MPa
Qualification test assembly torque (table 3): .... N·m

Burst test results (at least three samples burst tested)

Sample No.		Pressure at failure	Torque	Hardness	Type of failure
1	....	.... MPa	.... N·m	....	....
2	....	.... MPa	.... N·m	....	....
3	....	.... MPa	.... N·m	....	....

Cyclic endurance test results (at least six samples impulse tested)

Sample No.		Cycles at failure	Torque	Hardness	Type of failure
1	....	....	.... N·m	....	....
2	....	....	.... N·m	....	....
3	....	....	.... N·m	....	....
4	....	....	.... N·m	....	....
5	....	....	.... N·m	....	....
6	....	....	.... N·m	....	....

Conclusions: ....

Dimensions/List any exceptions: ....

Name (printed or typed) and signature of person certifying report:

.... Date: ....

Annex B
(informative)

Bibliography

[1] ISO 1179-1:—[5], *Connections for general use and fluid power — Ports and stud ends with ISO 228-1 threads with elastomeric or metal-to-metal sealing — Part 1: Threaded ports.*

[2] ISO 1179-2:—[5], *Connections for general use and fluid power — Ports and stud ends with ISO 228-1 threads with elastomeric or metal-to-metal sealing — Part 2: Heavy-duty (S series) and light-duty (L series) stud ends with elastomeric sealing (type E).*

[3] ISO 1179-3:—[5], *Connections for general use and fluid power — Ports and stud ends with ISO 228-1 threads with elastomeric or metal-to-metal sealing — Part 3: Light-duty (L series) stud ends with sealing by O-ring with retaining ring (types G and H).*

[4] ISO 1179-4:—[5], *Connections for general use and fluid power — Ports and stud ends with ISO 228-1 threads with elastomeric or metal-to-metal sealing — Part 4: Stud ends for general use only with metal-to-metal sealing (type B).*

[5] ISO 1302:1992, *Technical drawings — Method of indicating surface texture.*

[6] ISO 4755:1983, *Fasteners — Thread undercuts for external metric ISO threads.*

[7] ISO 8434-1:—[5], *Metallic tube connections for fluid power and general use — Part 1: 24 degree compression fittings.*

[8] ISO 8434-3:—[5], *Metallic tube connections for fluid power and general use — Part 3: O-ring face seal fittings.*

[9] ISO 8434-4:—[5], *Metallic tube connections for fluid power and general use — Part 4: 24 degree cone connectors with O-ring weld-on nipples.*

[10] ISO 11926-1:—[5], *Connections for general use and fluid power — Ports and stud ends with ISO 725 threads and O-ring sealing — Part 1: Threaded ports.*

[11] ISO 11926-2:—[5], *Connections for general use and fluid power — Ports and stud ends with ISO 725 threads and O-ring sealing — Part 2: Heavy-duty (S series) stud ends.*

[12] ISO 11926-3:—[5], *Connections for general use and fluid power — Ports and stud ends with ISO 725 threads and O-ring sealing — Part 3: Light-duty (L series) stud ends.*

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5) To be published.

(*Continued from second cover*)

International Standard	*Corresponding Indian Standard*	*Degree of Correspondence*
ISO 5598 : 1985 Fluid power systems and components — Vocabulary	IS 10416 : 1992 Fluid power systems and components — Vocabulary (*first revision*)	Identical
ISO 6149-1 : 1993 Connections for fluid power and general use — Ports and stud ends with ISO 261 threads and O-ring sealing — Part 1 : Ports with O-ring seal in truncated housing	IS 13170 (Part 1) : 1999 Connections for fluid power and general use — Ports and stud ends with ISO 261 threads and O-ring sealing: Part 1 Port with O-ring seal in truncated housing (*first revision*)	do

The technical committee responsible for the preparation of this standard has reviewed the provisions of the following ISO standards and has decided that they are acceptable for use in conjunction with this standard:

ISO 3601-3 : 1987	Fluid systems — Sealing devices — O-rings — Part 3 : Quality acceptance criteria
ISO 4759-1 : 1978	Tolerances for fasteners — Part 1: Bolts, screws and nuts with thread diameters between 1,6 (inclusive) and 150 mm (inclusive) and product grades A, B and C
ISO 6803 : 1994	Rubber or plastics hoses and hose assemblies — Hydraulic pressure impulse test without flexing
ISO 7789 : 1998	Hydraulic fluid power–Two-, three- and four-port screw-in cartridge valves–Cavities

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS 2:1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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